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Selling Winners and Losers: Discovery of New Disposition Effect in Korea

한국 주식시장에서의 비대칭매도성향효과 분석

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Abstract

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A new disposition effect refers to a tendency of investors to sell both winner and loser stocks, rather than to sell winner and hold loser stocks. This study investigates the asset pricing implications of the new disposition effect in the Korean stock markets. I find that stocks with either large unrealized gains or losses earn higher future returns than otherwise similar stocks do. This finding supports the hypothesis that stocks with larger unrealized gains and losses experience higher selling pressure that pushes down their price temporarily and their reversals to fundamentals lead to higher subsequent returns.

Keywords: cross-sectional return predictability, disposition effect, momentum effect

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1. Introduction

Shefrin and Statman (1985) defines a disposition effect as one in which investors are more likely to sell securities whose prices have increased since their purchase than those whose prices have decreased. Odean (1993) tests the disposition effect using trading records at a discount brokerage house and finds that investors tend to hold loser stocks too long because of their reluctance to realize their losses while they are likely to sell winner stocks too soon. This behavioral pattern has led to several studies on its asset pricing implications. For instance, Grinblatt and Han (2005) shows that the disposition effect creates a wedge between price and fundamental value and its convergence in subsequent periods generates a predictable pattern, which accounts for a momentum strategy. Frazzini (2006) suggests that the disposition effect causes under-reaction to news, which leads to return predictability and post-announcement price drift.

However, this view has been challenged since Ben-David and Hirshleifer (2012) showed a contrary position. In contrast to Odean (1993) that investors are inclined to hold big loser stocks more than small ones because of their reluctance to realize larger losses, Ben-David and Hirshleifer (2012) shows that investors are more likely to sell big loser stocks than small ones. They define a new disposition effect as one in which investors are more likely to sell winner stocks than loser stocks, but still tend to sell both winner and loser stocks. Figure 1 illustrates different relationships between selling propensity and unrealized profit, as posited by Odean (1993) and Ben-David and Hirshleifer (2012).

[INSERT FIGURE 1 HERE]

New evidence supporting that investors' selling propensity has a V-shaped function of unrealized profit, as shown in Figure 1, challenges the traditional disposition effect that presumes a monotonic function of unrealized profit. Li An (2016) compares two different measures of selling propensity, namely, capital gains overhang (CGO) that is based on the monotonic function and V-Shaped net selling propensity (VNSP) that is based on the V-shaped function. The comparison, which aims to investigate their asset pricing implications, shows that VNSP has return predictability, whereas CGO does not have when VNSP is controlled. The findings suggest that the new disposition effect generates selling pressure that causes the stock price to deviate from its fundamental value and its convergence generates return predictability.

In this study, I investigate the pricing implication of the new disposition effect in the Korean stock markets. I hypothesize that investors are more likely to sell securities when either their unrealized gains or losses increase in magnitude; in the given magnitudes, the selling propensity is stronger on unrealized gains than on unrealized losses. As a result, stocks with larger unrealized gains and losses experience higher selling pressure that pushes down the prices temporarily and their reversals to fundamentals lead to higher subsequent returns.

To test the hypothesis, I construct stock-level measures of unrealized gains and losses separately. This approach allows the examination of the different effects of unrealized gains and losses on stock future returns. The results show that both

unrealized gains and losses have positive effects on stock future returns, but unrealized gains are approximately 6.4 times stronger on stock future returns than unrealized losses are. Consequently, stocks with either large unrealized gains or losses earn higher future returns in the following months than otherwise similar stocks do. A trading strategy based on this new disposition effect generates significant monthly alphas of approximately 1% to 2%. On the other hand, a strategy based on the traditional disposition effect does not create any significant alphas.

This study has two major contributions. Primarily, it discovers the new disposition effect in the Korean stock markets. Many studies attempt to find the disposition effect in Korea, but are unsuccessful because of its non-existence in the Korean stock markets or lack of data. This paper compares the two types of disposition effects in stock-level analysis and concludes that the disposition effect suggested by Ben-David and Hirshleifer (2012) appears in the Korean stock markets. Moreover, this paper contributes to the literature on the momentum effect in the Korean stock markets by showing that the negative momentum effect survives even when the disposition effect is controlled. Thus, the evidence of Grinblatt and Han (2005), which states that the disposition effect drives the momentum effect, is not applicable to the Korean stock markets.

2. Sample and Key Variables

2.1. Stock samples and filters

I use daily and monthly stock data from Dataguide. I include all common shares listed in KOSPI and KOSDAQ in all industries except financials. The sample covers

the period from January 2000 to December 2015. To control anomalous effects of the smallest and most illiquid stocks, I require that stocks be worth more than KRW 1,000 at the time of portfolio formation and stocks have more than 10 trading days in the past month.

2.2. Unrealized gains and unrealized losses

I define aggregate unrealized gain (Gain) and loss (Loss) as the trading volume-weighted percentage deviation of the current price from the past purchase price, as defined by Li An (2016). For every month, I measure aggregate unrealized gain and loss of each stock separately to analyze their different effects on stock returns. They are computed using daily stock data to capture the most information in unrealized gains and losses.

The computation of aggregate unrealized gain (Gain) is as follows:

$$
\begin{aligned}
Gain_t &= \sum_{n=1}^{\infty} w_{t-n} \cdot gain_{t-n} \\
gain_{t-n} &= \frac{P_t - P_{t-n}}{P_t} \cdot \mathbf{1}_{\{P_{t-n} \le P_t\}} \qquad (\mathbf{1}) \\
w_{t-n} &= \frac{1}{K} \cdot V_{t-n} \prod_{i=1}^{n-1} [1 - V_{t-n+i}] \\
K &= \sum\nolimits_n V_{t-n} \prod_{i=1}^{n-1} [1 - V_{t-n+i}]
\end{aligned}
$$

where P_t and V_t are the stock price and turnover ratio at time *t*, and K is the normalizing constant.

For each stock, the aggregate unrealized gain (Gain) is measured as the weighted average of the percentage deviation of the current price from the past purchase price,

if the past purchase price is lower than the current price. $gain_{t-n}$ is the percentage deviation of the stock price from time *t-n* to time *t* and w_{t-n} is a proxy for the fraction of stocks purchased at time *t-n* and held until time *t*. Based on the work of Grinblatt and Han (2005), I use a five-year estimation window and rescale the weights to sum up to one. The estimation window enables to count on different investment horizons of investors.

A measure of aggregate unrealized loss (Loss) is the same as that of aggregate unrealized gain, except that Loss only accounts for the case in which the past purchase price is higher than the current price. The computation of aggregate unrealized loss (Loss) is as follows:

$$Loss_t = \sum_{n=1}^{\infty} w_{t-n} \cdot loss_{t-n}$$

$$loss_{t-n} = \frac{P_t - P_{t-n}}{P_t} \cdot \mathbf{1}_{\{P_{t-n} > P_t\}} \qquad (\mathbf{2})$$

$$w_{t-n} = \frac{1}{K} \cdot V_{t-n} \prod_{i=1}^{n-1} [1 - V_{t-n+i}]$$

$$K = \sum\nolimits_n V_{t-n} \prod_{i=1}^{n-1} [1 - V_{t-n+i}]$$

Figure 2 illustrates time-series aggregate unrealized gain and loss during the sample period.

[INSERT FIGURE 2 HERE]

2.3. V-shaped net selling propensity and capital gains overhang

Based on the work of Li An (2016) and Frazzini (2006), I construct two measures of selling propensity, namely, VNSP and CGO. VNSP presumes the new disposition effect of Ben-David and Hirshleifer (2012) and CGO presumes the traditional disposition effect of Odean (1993).

$$VNSP_t = Gain_t + \alpha \cdot Loss_t$$
$$CGO_t = Gain_t + Loss_t \quad (3)$$

where α is a constant.

The constant α reflects different effects of Gain and Loss on stock future returns. I estimate the constant α in section of 3.2 of this paper through Fama-MacBeth regression and test its validity in section of 3.4 through the VNSP sensitivity test.

2.4. Other control variables

Some variables are controlled to obtain the real effects of unrealized gains and losses on stock future returns. First, I control past returns at different time horizons and average turnover ratio in the past one year. Having high correlation with Gain and Loss, they have significant effects on stock future returns. The past 1-month and the past 36- to 13-month returns, Ret_{-1} and $Ret_{-36,-13}$, control the short- and long-term reversals addressed by Jegadeesh (1990) and De Bondt and Thaler (1985). The positive and negative past 12- to 2-month returns, $Ret^{+}_{-12,-2}$ (= Max{$Ret_{-12,-2}$, 0}) and $Ret^{-}_{-12,-2}$ (= Min{$Ret_{-12,-2}$, 0}) control the momentum effect documented by Jegadeesh

and Titman (1993) and Hong, Lim, and Stein (2000). The separation into the positive and negative parts explains that the positive and negative momentum effects are different in magnitude. Second, I control the idiosyncratic volatility, ivol. Higher idiosyncratic volatility has a significant effect on future returns, as documented by Ang, et al. (2006) and Fu (2009), and it leads to stocks with larger unrealized gains and losses. I measure ivol as the volatility of daily return residuals derived from the Fama-French three-factor model in the past one year. Lastly, I control size and value factors that cause anomalous patterns in subsequent returns. The logarithm of book-to-market ratio, logBM, is used as suggested by Daniel and Titman (2006), as well as the logarithm of market capitalization, logmktcap.

Gain, Loss, CGO, VNSP, and all control variables are summarized in Table 1, Panel A and Panel B. Panel C presents a correlation table. All panels in Table 1 report the time-series average of statistics calculated at monthly-level.

[INSERT TABLE 1 HERE]

3. Empirical setup and results

I conduct four analyses to study how unrealized gains and losses affect stock future returns. First, I construct double-sorted portfolios by aggregate unrealized gain (Gain) and loss (Loss). These portfolios show the overall picture of the respective effects of Gain and Loss on stock future returns. Second, I run a Fama-MacBeth regression to further examine their respective effects on the magnitude of

stock future returns when controlling all control variables. Third, I compare V-shaped net selling propensity (VNSP) with capital gains overhang (CGO) to identify which of the two different disposition effects fits into the Korean stock markets. In there, VNSP uses the estimated number obtained from the Fama-MacBeth regression to adjust different effects of Gain and Loss on stock future returns. So finally, I conduct the VNSP sensitivity test to validate the estimated number.

3.1. Double sorted portfolio

Double sorted portfolios are constructed on aggregate unrealized gain (Gain) and loss (Loss) to examine the respective effects of Gain and Loss on stock returns in the following month. To address the correlations of Gain and Loss with some common variables that affect future returns, I use the residual Gain and Loss to sort stocks. The residuals are obtained from the following models:

$$Gain_{t-1} = \alpha + \beta_1 Ret_{t-1} + \beta_2 Ret^{+}_{t-12,t-2} + \beta_3 Ret^{-}_{t-12,t-2} + \beta_4 Ret_{t-36,t-13} + \beta_5 logmktcap_{t-1} + \beta_6 turnover_{t-1} + \beta_7 ivol_{t-1} + \varepsilon_t$$

$$Loss_{t-1} = \alpha + \beta_1 Ret_{t-1} + \beta_2 Ret^{+}_{t-12,t-2} + \beta_3 Ret^{-}_{t-12,t-2} + \beta_4 Ret_{t-36,t-13} + \beta_5 logmktcap_{t-1} + \beta_6 turnover_{t-1} + \beta_7 ivol_{t-1} + \varepsilon_t \quad (\mathbf{4})$$

I run cross-sectional regressions of aggregate unrealized gain and loss on past returns, size, turnover, and idiosyncratic volatility. Based on the residual values derived from the regressions, I assign stocks independently into 3 by 3 portfolios at the end of each month. Each portfolio is held for the next one month and the stocks are weighted by their gross returns in the previous month. The gross return weights

minimize the confounding microstructure effects, as suggested by Asparouhova, Bessembinger, and Kalcheva (2010).

[INSERT TABLE 2 HERE]

Table 2 shows the clear patterns with respect to Gain and Loss. At each level of aggregate unrealized gain or loss, monthly stock returns increase monotonically from quintile Small to quintile Large. Furthermore, all Large-Small spread portfolios yield significantly positive returns. This result supports the hypothesis that larger unrealized gains and losses generate higher selling pressure that lowers stock prices temporarily, and the reversals to fundamentals lead to higher subsequent returns.

3.2. Fama-MacBeth regression analysis

To further examine the robustness of the result in section of 3.1. Double sorted portfolio, I run a Fama-MacBeth regression as follows:

$$Ret_t = \alpha + \beta_1 Gain_{t-1} + \beta_2 Loss_{t-1} + \gamma_1 X_{1,t-1} + \gamma_2 X_{2,t-1} + \epsilon_t \qquad (\mathbf{5})$$

where Ret is monthly return, Gain and Loss are aggregate unrealized gain and loss, X_1 and X_2 are two sets of control variables, and subscript t denotes variables with information up to the end of month t.

X_1 includes the past 12- to 2-month returns to control the momentum effect: $Ret^{+}_{-12,-2}$, and $Ret^{-}_{-12,-2}$. X_2 includes other control variables that affect stock future

returns: the past 1-month return, the past 36- to 13-month return, log book to market ratio, log size, turnover ratio, and idiosyncratic volatility.

I run multiple regressions with several combinations of control variables to examine the sensitivity of key variables to control variables. For each regression, coefficient estimates for all months and for February to December are reported separately because of the "January effect" that possibly affects predictable variables.

Table 3 presents the results of the Fama-MacBeth regressions of equation (5); in columns (1) and (2), I regress monthly stock return on one-month-lagged Gain and Loss without control variables; in columns (3) and (4), I add X_1, the positive and negative past 12- to 2-month returns, to control the asymmetric momentum effect; in columns (5) and (6), I include all control variables in X_2 and exclude ones in X_1; in columns (7) and (8), I include all control variables in X_1 and X_2; in columns (9) and (10), I replace the positive and negative past 12- to 2-month returns with one integrated past 12- to 2-month return based on the assumption that the momentum effect is symmetric. These benchmarks in columns (7) and (8) enable to determine the relationship between the disposition effects and the momentum effects in more detail.

In every column, the estimated coefficients of aggregate unrealized gain (Gain) and loss (Loss) are significantly positive and negative. Since Loss is negative and becomes positive when multiplied by its negative coefficient, the results show that both large unrealized gains and losses increase stock future returns. The results support the new disposition effect documented by Ben-David and Hirshleifer (2012) and Li An (2016), which shows that stocks with larger unrealized gains and losses

experience higher selling pressure that pushes down their prices temporarily, and their reversals to fundamentals lead to higher subsequent returns.

In column (7) where all control variables are included, the monthly future returns increase by 5.3 percent and 0.8 percent when Gain and Loss increase by 1 percent in absolute value, respectively. This finding is in accordance with the asymmetric V-shaped selling schedule documented by Ben-David and Hirshleifer (2012) in which the selling propensity is stronger on unrealized gains than on unrealized losses.

From columns (5) to (10), the coefficients of Gain and Loss vary by the control of the momentum effect because of significant correlation of the momentum effect with unrealized gains and losses. However, the positive and negative parts of the momentum effect have different effects on the coefficients of Gain and Loss in the regression. First, the positive momentum effect increases unrealized gains. Since both the positive momentum effect and increased unrealized gains lead to higher future returns, the coefficient of Gain would have an upward bias without controlling the positive momentum effect. Second, the negative momentum effect increases the absolute value of unrealized losses. Since the negative momentum effect leads to lower future returns while increased unrealized losses in absolute value lead to higher future returns, the absolute value of coefficient of Loss would have a downward bias without controlling the negative momentum effect.

Their different effects on coefficients, along with the fact that the negative momentum effect is stronger than the positive one, as documented by Hong, Lim, and Stein (2000), require the regression to control the asymmetric momentum effect with the positive and negative past 12- to 2-month returns, rather than to control the

symmetric momentum effect with the integrated past 12- to 2-month returns as shown in columns (9) and (10). Otherwise, the coefficients of Gain and Loss would not capture their true effects on stock future returns.

In columns (7) and (8), including proper control variables, the negative momentum effect survives when the disposition effect is controlled by Gain and Loss variables. This finding is inconsistent with the hypothesis of Grinblatt and Han (2005) that the disposition effect drives the momentum effect. The reason is that the newly documented disposition effect by Ben-David and Hirshleifer (2012) works against the momentum effect on the loss side.

The results in Table 3 support the hypothesis that investors are more likely to sell securities when either their unrealized gains or losses increase in magnitude; in given magnitudes, their selling propensity is stronger on unrealized gains than on unrealized losses. Thus, stocks with larger unrealized gains and losses experience higher selling pressure that pushes down their price temporarily, and their reversals to fundamentals lead to higher subsequent returns.

[INSERT TABLE 3 HERE]

3.3. Comparing V-shaped net selling propensity (VNSP) with capital gains overhang (CGO)

I compare two different measures of selling propensity: VNSP based on the new disposition effect and CGO based on the traditional disposition effect.

Li An (2016) provides one methodology to realize the pronounced kink and non-monotonicity in the V-shaped function illustrated in Figure 1. Using the coefficients of Gain and Loss derived from the Fama-MacBeth regression, Li An (2016) estimates the relative degree of selling propensities on unrealized gains and losses. Following the methodology, I estimate V-shaped net selling propensity (VSNP) as follows:

$$VNSP_t \approx Gain_t - \frac{1}{6.4} \cdot Loss_t \quad (\mathbf{6})$$

The constant number 6.4 is obtained from the Fama-MacBeth regression in column (7) of Table 3. The regression suggests that Gain is approximately 6.4 times (5.307/0.826) stronger than Loss in predicting future returns. It implies that given the level of Gain and Loss, selling pressure caused by Gain is 6.4 times stronger than one by Loss. Consequently, VNSP reflects that both Gain and Loss trigger selling pressure but the pressure is stronger on Gain than on Loss. This is in accordance with the asymmetric V-shaped selling schedule of Ben-David and Hirshleifer (2012).

In contrast to VNSP, CGO is based on the monotonic function of unrealized profit illustrated in Figure 1. It presumes that investors tend to hold stocks with unrealized losses rather than to sell them. This condition is consistent with the study by Odean (1993). I compute capital gains overhang (CGO) as follows:

$$CGO_t = Gain_t + Loss_t \quad (\mathbf{7})$$

To examine which of the two measures of selling propensity fits into the Korean stock markets, I construct five portfolios based on VNSP and CGO respectively and assign stocks into portfolios at the end of each month. Each portfolio is held for the

next one month. I report returns in three different weight schemes – equal weights, gross return weights, and value weights – to see whether the microstructure effect or the size effect exists. For each scheme, the coefficient estimates for all months and for February to December are reported separately as in Table 3.

In Table 4, Panel A shows that monthly stock returns increase monotonically with the magnitude of VNSP in every weight scheme. Also, all Largest-Smallest spread portfolios yield significantly positive returns. These findings suggest that the new disposition effect appears in every stock regardless of the size and microstructure effects. Another finding that returns for the 12-month period are higher than those for the 11-month period excluding January implies that the Korean stock markets have the "January effect" in which overall stock returns increase.

In Panel B, the portfolios based on CGO do not present monotonic patterns. In contrast to previous findings of Grinblatt and Han (2005) and Frazzini (2006) that future returns increase monotonically with the magnitude of CGO, Panel B shows that future returns and CGO have the U-shaped relationship. Since stocks with larger unrealized gains or losses are mostly assigned into Largest and Smallest CGO quintiles in accordance with equation (7), the U-shaped relationship where extreme portfolios have the highest returns, indirectly suggests that investors are likely to sell both winner and loser stocks, rather than to sell winner and hold loser stocks. Thus, the results in Panel B imply the new disposition effect.

To address the correlations of VNSP and CGO with control variables, in Panel C and Panel D, I repeat the same exercise with residual VNSP and CGO. The residuals are constructed in the same way as in Table 2:

$$VNSP_{t-1} = \alpha + \beta_1 Ret_{t-1} + \beta_2 Ret^{+}_{t-12,t-2} + \beta_3 Ret^{-}_{t-12,t-2} + \beta_4 Ret_{t-36,t-13} + \beta_5 logmktcap_{t-1} + \beta_6 turnover_{t-1} + \beta_7 ivol_{t-1} + \varepsilon_t$$

$$CGO_{t-1} = \alpha + \beta_1 Ret_{t-1} + \beta_2 Ret^{+}_{t-12,t-2} + \beta_3 Ret^{-}_{t-12,t-2} + \beta_4 Ret_{t-36,t-13} + \beta_5 logmktcap_{t-1} + \beta_6 turnover_{t-1} + \beta_7 ivol_{t-1} + \varepsilon_t \quad (\mathbf{8})$$

In Panel C and Panel D, the same patterns emerge as in Panel A and Panel B. In Panel C, stock future returns increase monotonically with the magnitude of residual VNSP, and in Panel D, stock future returns have the U-shaped relationship with residual CGO.

[INSERT TABLE 4 HERE]

To further examine the patterns in magnitude when controlling all control variables, I run Fama-MacBeth regressions. For each regression in Table 5, the coefficient estimates for all months and for February to December are reported separately.

In Table 5, columns (3) and (4) show that VNSP has a significant power in predicting stock future returns, whereas in columns (1) and (2), CGO has a marginal one. In columns (5) and (6) where both CGO and VNSP are regressed together on stock future returns, VNSP keeps its significance while CGO becomes insignificant. Furthermore, as suggested in Table 3, the negative momentum effect survives even when the disposition effects are controlled with two measures of selling propensity.

Overall, the results show that VNSP has very strong return predictability while CGO does not have. These results are in accordance with the hypotheses of Ben-David and Hirshleifer (2012) and Li An (2016), which state that selling propensity

has a V-shaped function with unrealized profit, and its measure, VNSP has return predictability. In addition, the significant negative momentum effect under the disposition effects suggests that Grinblatt and Han (2005) that the disposition effect accounts for the momentum effect, is not applicable to the Korean stock markets.

[INSERT TABLE 5 HERE]

3.4. VNSP sensitivity test

I estimate alpha (α) in equation (9) as the ratio of coefficients of Gain and Loss, which are obtained from the Fama-MacBeth regression in column (7) of Table 3.

$$VNSP_t = Gain_t + \alpha \cdot Loss_t \quad (\mathbf{9})$$

To test the validity of its estimated alpha, I check the sensitivity of VNSP to varying alpha. I set the range of alpha from -1 to 1; -1 represents symmetric V-shaped net selling propensity and 1 represents monotonically increasing selling propensity, which is presumed by capital gains overhang (CGO). Since positive alpha presumes the traditional disposition effect in which investors tend to sell winner and hold loser stocks, (0, 1] is named as the CGO side. In contrast, [-1, 0) is named as the VNSP side since negative alpha presumes the new disposition effect in which investors tend to sell both winner and loser stocks.

Figure 3 illustrates selling propensity by varying alpha:

[INSERT FIGURE 3 HERE]

I repeat the exercise in Panel A of Table 4 while replacing alpha for VNSP in the range of [-1, 1]. I report returns in three weight schemes: equal weights, gross return weights, and value weights.

In Table 6, regardless of the weight schemes, the results share similar relations between monthly stock returns and estimated VNSP. On the CGO side, stock future returns and estimated VNSP have the U-shaped relations in which Largest and Smallest portfolios have the highest returns. However, on the VNSP side they have the monotonically increasing relations. Furthermore, the Largest-Smallest spread portfolios yield significantly positive returns only on the VNSP side. This result shows that the VNSP measure is robust in the reasonable boundary of alpha.

As a result, this test validates the use of estimated VNSP in the analysis for Table 4 and Table 5, and provides further evidence that the disposition effect of Ben-David and Hirshleifer (2012) is more suitable for the Korean stock markets than that of Shefrin and Statman (1985) and Odean (1993).

[INSERT TABLE 6 HERE]

4. Robustness check

I conduct subsample analysis to determine whether the 2008 financial crisis dominates or distorts the aforementioned results. Since the 2008 financial crisis generates a large amount of unrealized losses as illustrated in Figure 2, subsample analysis is necessary to examine whether the new disposition effect exists over all periods or is merely driven by a certain event.

I replicate Tables 2, 3, 4, and 5 using a subsample, which covers the period from 2000 January to 2007 December. In Table 7, double-sorted portfolios present the similar patterns as in Table 2. Although their significance in the subsample is weaker, in most levels of unrealized gains and losses, stock future returns increase from quintile Small to quintile Large and Large-Small spread portfolios yield significantly positive returns. In Table 8, the results of the Fama-MacBeth regressions in the subsample also hold the same patterns as in the full sample. Although they have different size of coefficients, they still maintain the similar ratio of Gain and Loss coefficients as shown in Table 3. In Table 9, I conduct portfolio analysis to compare VNSP and CGO in the subsample. Panel A and Panel C show that stock future returns increase with the magnitude of VNSP, whereas in Panel B and Panel D stock future returns have a U-shaped relation with CGO. These patterns are the same as those in Table 4. The following Fama-MacBeth regression in Table 10 confirms that VNSP has return predictability while CGO does not.

[INSERT TABLE 7 HERE]

[INSERT TABLE 8 HERE]

[INSERT TABLE 9 HERE]

[INSERT TABLE 10 HERE]

The findings in the full sample are robust in the subsample analysis. The subsample analysis corroborates the hypothesis: investors are more likely to sell securities when either their unrealized gains or losses increase in magnitude; in the given magnitudes, their selling propensity is stronger on unrealized gains than on unrealized losses. As a result, stocks with larger unrealized gains and losses experience higher selling pressure that pushes down their prices temporarily and their reversals to fundamentals lead to higher subsequent returns.

5. Conclusion

In this study, I provide new evidence for the pricing implication of the newly documented disposition effect by Ben-David and Hirshleifer (2012) in the Korean stock markets. Based on the stylized fact that investors are more likely to sell their securities when either their unrealized gains or losses increase, this study suggests that stocks with larger unrealized gains or losses experience higher selling pressure that pushes down their price temporarily, and their reversals to fundamentals lead to higher subsequent returns.

I construct stock-level measures of unrealized gains *(Gain)* and losses *(Loss)* separately and determine their cross-sectional return predictability. The finding suggests that both unrealized gains and losses have positive effects on stock future returns, but unrealized gains are approximately 6.4 times stronger in predicting future returns than unrealized losses are. This result is consistent with the asymmetric V-shaped selling schedule documented by Ben-David and Hirshleifer (2012).

Following Li An (2016), I construct V-shaped net selling propensity (VNSP) using the estimated alpha derived from the Fama-MacBeth regression to recognize the asymmetric V-shaped selling schedule. The measure, *VNSP* has strong return predictability whereas capital gains overhang (CGO) does not have. This finding suggests that in the Korean stock markets, investors are more likely to sell securities when either their unrealized gains or losses increase; thus, their selling propensity generates return predictability.

Finally, this study provides evidence contrary to the previous finding of Grinblatt and Han (2005) that the disposition effect drives the momentum effect. I find that the negative momentum effect still remains under either the traditional disposition effect or the new disposition effect. Thus, the hypothesis of Grinblatt and Han (2005) is not applicable to the Korean stock markets.

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Figure 1

V-shaped selling propensity and monotonic selling propensity in response to unrealized profit

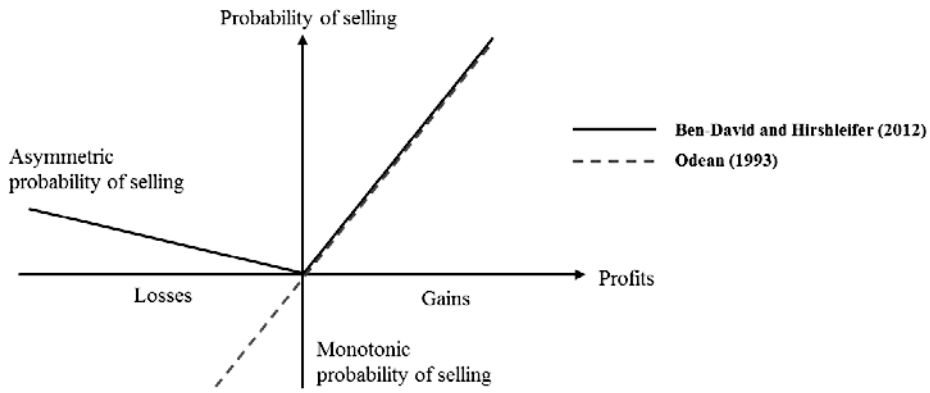

Figure 2

Time-series aggregate unrealized gain and loss

Solid lines represent 90 percentile and 10 percentile in aggregate unrealized gain *(Gain)* and loss *(Loss)* respectively; broken lines represent 50 percentiles; dotted lines represent 10 percentile and 90 percentile in aggregate unrealized gain and loss respectively.

Figure 3

Selling propensity by alpha

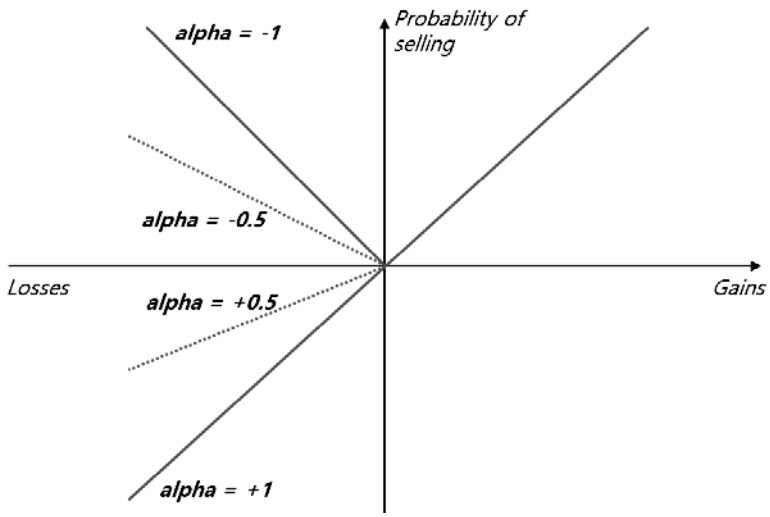

Table 1

Summary statistics of key variables and control variables

Panel A and B report summary statistics for selling propensity variables and control variables, respectively, and Panel C presents a correlation table of all variables. Gain is defined as $Gain_t = \sum_{n=1}^{N} w_{t-n} \cdot \frac{P_t - P_{t-n}}{P_t} \cdot \mathbf{1}_{\{P_{t-n} \le P_t\}}$ using daily price P_{t-n} within five years prior to time t, and w_{t-n} is a volume-based weight that serves as a proxy for the fraction of stockholders at time t who bought the stock at P_{t-n}; Loss is defined as $Loss_t = \sum_{n=1}^{N} w_{t-n} \cdot \frac{P_t - P_{t-n}}{P_t} \cdot \mathbf{1}_{\{P_{t-n} > P_t\}}$ using P_{t-n} within the same period. Gain and Loss are winsorized at 1% level in each tail. Capital gains overhang (CGO) = Gain + Loss, and V-shaped net selling propensity (VNSP) = Gain – 0.16 Loss. $Ret_{-12,-2}$ is the previous 12- to 2-month cumulative return, $Ret^{+}_{-12,-2}$ and $Ret^{-}_{-12,-2}$ are the positive part and the negative part of $Ret_{-12,-2}$, Ret_{-1} is the past 1-month return, $Ret_{-36,-13}$ is the past 36- to 13-month cumulative return, logBM is the logarithm of book-to-market ratio, logmktcap is the logarithm of a firm's market capitalization, turnover is the average daily turnover ratio in the past one year, and finally, ivol is the idiosyncratic volatility, calculated as the volatility of daily return residuals with respect to the Fama-French three-factor model in the past one year. All numbers presented are the time-series average of the cross-sectional statistics.

Panel A: Summary statistics for net selling propensity variables				
	Gain	Loss	CGO	VNSP
Mean	0.076	-0.187	-0.112	0.106
p50	0.035	-0.096	-0.060	0.072
SD	0.097	0.315	0.357	0.095
Skew	1.859	-7.054	-5.029	2.156
p10	0.001	-0.441	-0.426	0.028
p90	0.217	-0.004	0.199	0.236

Panel B: Summary statistics for control variables							
	Ret_{-1}	$Ret_{-12,-2}$	$Ret_{-36,-13}$	logBM	logmktcap	turnover	ivol
Mean	1.714	21.180	47.319	0.204	4.546	0.019	2.971
p50	0.000	13.160	36.000	0.248	4.263	0.009	2.757
SD	16.404	56.186	83.212	0.852	1.545	0.032	1.162
Skew	3.274	1.675	1.287	-0.366	1.083	7.012	0.935
p10	-14.110	-36.170	-41.160	-0.889	2.897	0.002	1.680
p90	18.520	87.630	148.980	1.218	6.584	0.044	4.576

(Continued)

Panel C: Correlation Table													
	Gain	Loss	CGO	VNSP	Ret_{-1}	$Ret_{-12,-2}$	$Ret^{+}_{-12,-2}$	$Ret^{-}_{-12,-2}$	$Ret_{-36,-13}$	logmktcap	logBM	turnover	ivol
Gain	1.00												
Loss	0.30	1.00											
CGO	0.54	0.97	1.00										
VNSP	0.86	-0.22	0.04	1.00									
Ret_{-1}	0.33	0.21	0.27	0.22	1.00								
$Ret_{-12,-2}$	0.29	0.26	0.30	0.16	-0.04	1.00							
$Ret^{+}_{-12,-2}$	0.25	0.16	0.21	0.18	-0.03	0.94	1.00						
$Ret^{-}_{-12,-2}$	0.22	0.36	0.37	0.04	-0.03	0.63	0.34	1.00					
$Ret_{-36,-13}$	0.02	0.00	0.01	0.02	-0.04	-0.14	-0.09	-0.17	1.00				
logmktcap	0.22	0.18	0.22	0.13	-0.01	0.10	0.07	0.13	0.10	1.00			
logBM	0.07	0.00	0.02	0.07	0.03	0.10	0.07	0.13	-0.32	-0.29	1.00		
turnover	-0.20	0.11	0.04	-0.26	-0.01	0.21	0.25	0.01	0.10	0.02	-0.12	1.00	
ivol	-0.12	-0.05	-0.08	-0.10	0.04	0.34	0.44	-0.06	0.12	-0.31	-0.12	0.48	1.00

Table 2

Portfolio sorts on residual gain and loss

This table reports returns on double-sorted portfolios based on the residual values of gain and loss. The residuals are constructed by regressing Gain and Loss on past returns, size, turnover, and idiosyncratic volatility. At the end of each month, stocks are independently sorted by the residual gain and loss. Stocks in a portfolio are weighted by their gross returns in the previous month. Each portfolio is to be held for the following one month, and the time-series average of portfolio returns is reported. The returns are in monthly percent, and t-statistics for the difference between portfolios 3 and 1 are in square brackets. *, **, and *** denote significance levels at 10%, 5%, and 1%.

Panel A: Double sorts on residual gain and loss, Adjusted Return					
	Small gain	G2	Large gain	3-1	*t*-stat
Small loss	0.55	0.81	1.33	0.78***	[3.15]
L2	0.71	0.84	1.34	0.63***	[3.53]
Large loss	1.05	1.40	1.97	0.93***	[3.87]
3-1	0.49**	0.58**	0.64**		
t-stat	[1.96]	[2.49]	[2.35]		
Panel B: Number of firms in each portfolio					
	Small gain	G2	Large gain		
Small loss	50.5	95.6	97.9		
L2	95.8	138.7	87.6		
Large loss	99.2	87.5	58.0		

Table 3

Predicting returns with unrealized gain and loss, Fama-MacBeth regressions

This table reports results of Fama-MacBeth (1973) regressions of one-month return on lagged gain and loss variables and a set of control variables. The dependent variable is return in month *t*, and the explanatory variables are available at the end of month *t-1*. Gain and Loss are defined in Equations (1) and (2). $Ret_{-12,-2}$ is the previous 12- to 2-month cumulative return, $Ret^{+}_{-12,-2}$ and $Ret^{-}_{-12,-2}$ are the positive and negative parts of $Ret_{-12,-2}$, Ret_{-1} is the past 1-month return, $Ret_{-36,-13}$ is the past 36- to 13-month cumulative return, logBM is the logarithm of book-to-market ratio, logmktcap is the logarithm of a firm's market capitalization, turnover is the average daily turnover ratio in the past one year, and finally, ivol is the idiosyncratic volatility, calculated as the volatility of daily return residuals with respect to Fama-French three-factor model in the past one year. The parameters and *t*-statistics (shown in square brackets) are calculated using the time series of corresponding cross-sectional regression estimates.*, **, and *** denote significance levels at 10%, 5%, and 1%. R^2 is the average R^2 from the cross-sectional regressions. Coefficient estimates for all months and for February to December are reported separately.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All	Feb-Dec	All	Feb-Dec	All	Feb-Dec	All	Feb-Dec	All	Feb-Dec
Gain	2.427*	3.176**	2.380*	3.250**	5.327***	5.538***	5.307***	5.756***	5.228***	5.624***
	[1.79]	[2.25]	[1.74]	[2.28]	[4.53]	[4.50]	[4.94]	[5.12]	[4.90]	[5.05]
Loss	-1.360***	-1.317***	-1.811***	-1.782***	-0.530**	-0.529**	-0.826***	-0.841***	-0.639***	-0.619***
	[-5.32]	[-4.93]	[-7.65]	[-7.24]	[-2.16]	[-2.06]	[-3.81]	[-3.73]	[-2.82]	[-2.62]
$Ret^{+}_{-12,-2}$			-0.004	-0.005*			0.001	0.000		
			[-1.58]	[-1.80]			[0.52]	[0.05]		
$Ret^{-}_{-12,-2}$			0.031***	0.032***			0.015***	0.016***		
			[6.68]	[6.57]			[3.70]	[3.64]		
$Ret_{-12,-2}$									0.003	0.002
									[1.35]	[0.80]
Ret_{-1}					-0.052***	-0.051***	-0.052***	-0.052***	-0.052***	-0.052***
					[-10.31]	[-9.61]	[-10.12]	[-9.50]	[-10.00]	[-9.38]
$Ret_{-36,-13}$					-0.003***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***

					[-3.15]	[-3.00]	[-2.67]	[-2.63]	[-2.90]	[-2.85]
logmktcap					-0.216***	-0.166**	-0.227***	-0.166**	-0.236***	-0.176**
					[-2.87]	[-2.20]	[-3.04]	[-2.24]	[-3.12]	[-2.35]
logBM					0.309***	0.316***	0.277***	0.296***	0.281***	0.303***
					[3.00]	[3.24]	[2.76]	[3.13]	[2.79]	[3.17]
turnover					-1.704	-1.437	-1.624	-1.276	-1.852	-1.546
					[-0.81]	[-0.64]	[-0.76]	[-0.56]	[-0.85]	[-0.67]
ivol					-0.461***	-0.515***	-0.480***	-0.504***	-0.508***	-0.538***
					[-4.44]	[-4.81]	[-4.53]	[-4.57]	[-4.53]	[-4.58]
Constant	0.528	0.218	0.805*	0.516	3.013***	2.642***	3.096***	2.597***	3.133***	2.644***
	[1.00]	[0.39]	[1.68]	[1.03]	[5.29]	[4.57]	[5.24]	[4.35]	[5.27]	[4.41]
Avg.Monthly Obs.	808	811	806	809	802	805	800	803	801	804
R^2	0.016296	0.016588	0.034075	0.034383	0.071096	0.070297	0.081259	0.080599	0.077489	0.076786
# of months	192	176	192	176	192	176	192	176	192	176

Table 4

Portfolio sorts on V-shaped net selling propensity and capital gains overhang

This table reports returns on portfolios constructed based on net selling propensity variables. In Panel A, stocks are sorted by the V-shaped Net Selling Propensity (VNSP) into five portfolios at the end of each month, with portfolio 5 containing stock with the highest VNSP. Portfolios are constructed using equal weights, gross return weights, and value weights. Each portfolio is to be held for the following one month, and the time-series average of portfolio returns is reported. For each weighting scheme, results for all months and the February to December period are reported. Panel B presents the same set of results in which stocks are sorted on the capital gains overhang (CGO). Panels C and D repeat the same exercises, but base the sorts on residual VNSP and residual CGO. The residuals are constructed by regressing raw net selling propensity variables (VNSP or CGO) on past returns, firm size, turnover, and idiosyncratic volatility. The returns are in monthly percent, and *t*-statistics for the difference between portfolios 5 and 1 are in square brackets. *, **, and *** denote significance levels at 10%, 5%, and 1%.

Panel A: Portfolio return, sorted on V-shaped net selling propensity (VNSP)						
	Equal weights		Gross weights		Value weights	
VNSP	All	Feb.-Dec.	All	Feb.-Dec.	All	Feb.-Dec.
Smallest	0.107	-0.220	0.025	-0.294	0.033	-0.252
2	0.961	0.621	0.956	0.607	0.850	0.549
3	1.192	0.918	1.180	0.902	1.099	0.848
4	1.523	1.294	1.505	1.278	1.482	1.279
Largest	1.747	1.575	1.697	1.524	1.699	1.558
5-1	1.639***	1.795***	1.672***	1.818***	1.666***	1.810***
t-stat	[6.83]	[7.22]	[6.97]	[7.28]	[6.86]	[7.12]
Panel B: Portfolio return, sorted on capital gains overhang (CGO)						
	Equal weights		Gross weights		Value weights	
CGO	All	Feb.-Dec.	All	Feb.-Dec.	All	Feb.-Dec.
Smallest	1.582	1.284	1.518	1.222	1.448	1.170
2	0.979	0.667	0.975	0.668	0.834	0.535
3	0.812	0.497	0.790	0.484	0.764	0.476
4	0.834	0.595	0.813	0.574	0.814	0.620
Largest	1.330	1.151	1.322	1.125	1.384	1.245
5-1	-0.252	-0.133	-0.195	-0.098	-0.064	0.075
t-stat	[-0.81]	[-0.41]	[-0.63]	[-0.30]	[-0.20]	[0.23]
Panel C: Portfolio return, sorted on V-shaped net selling propensity (VNSP) residual						
	Equal weights		Gross weights		Value weights	
res VNSP	All	Feb.-Dec.	All	Feb.-Dec.	All	Feb.-Dec.

Smallest	0.786	0.518	0.771	0.495	0.767	0.521
2	0.703	0.413	0.672	0.384	0.651	0.381
3	0.894	0.650	0.874	0.633	0.838	0.647
4	1.259	0.995	1.226	0.970	1.206	0.985
Largest	1.889	1.612	1.836	1.553	1.847	1.604
5-1	1.104***	1.094***	1.065***	1.059***	1.080***	1.083***
t-stat	[5.26]	[4.84]	[5.12]	[4.71]	[5.22]	[4.87]

Panel D: Portfolio return, sorted on capital gains overhang (CGO) residual

	Equal weights		Gross weights		Value weights	
res CGO	All	Feb.-Dec.	All	Feb.-Dec.	All	Feb.-Dec.
Smallest	1.562	1.351	1.477	1.276	1.483	1.263
2	1.018	0.726	1.013	0.713	0.991	0.755
3	0.929	0.613	0.895	0.586	0.903	0.644
4	0.775	0.569	0.762	0.559	0.763	0.604
Largest	1.253	0.937	1.261	0.933	1.206	0.907
5-1	-0.309	-0.414**	-0.216	-0.343	-0.276	-0.356*
t-stat	[-1.44]	[-1.97]	[-1.00]	[-1.63]	[-1.24]	[-1.64]

Table 5

Predicting returns with CGO and VNSP, Fama-MacBeth regressions

This table reports results of Fama-MacBeth (1973) regressions of one-month return on lagged CGO and VNSP variables and a set of control variables. The dependent variable is return in month *t*, and the explanatory variables are available at the end of month *t-1*. VNSP and CGO are defined in Equation (6) and (7). $Ret^{+}_{-12,-2}$ and $Ret^{-}_{-12,-2}$ are the positive and negative parts of the past 12- to 2-month cumulative return. Ret_{-1} is the past 1-month return, $Ret_{-36,-13}$ is the past 36- to 13-month cumulative return, logBM is the logarithm of book-to-market ratio, logmktcap is the logarithm of a firm's market capitalization, turnover is the average daily turnover ratio in the past one year, and finally, ivol is the idiosyncratic volatility, calculated as the volatility of daily return residuals with respect to Fama-French three-factor model in the past one year. The parameters and *t*-statistics (shown in square brackets) are calculated using the time series of corresponding cross-sectional regression estimates.*, **, and *** denote significance levels at 10%, 5%, and 1%. R^2 is the average R^2 from the cross-sectional regressions. Coefficient estimates for all months and for February to December are reported separately.

	(1)	(2)	(3)	(4)	(5)	(6)
	All	Feb-Dec	All	Feb-Dec	All	Feb-Dec
CGO	0.376	0.406*			0.020	0.069
	[1.64]	[1.69]			[0.09]	[0.29]
VNSP			4.922***	5.442***	5.287***	5.687***
			[6.46]	[6.81]	[5.56]	[5.70]
$Ret^{+}_{-12,-2}$	0.004*	0.003	0.001	0.000	0.001	0.000
	[1.83]	[1.37]	[0.51]	[0.02]	[0.52]	[0.05]
$Ret^{-}_{-12,-2}$	0.013***	0.014***	0.015***	0.016***	0.015***	0.016***
	[3.20]	[3.18]	[3.41]	[3.45]	[3.70]	[3.64]
Ret_{-1}	-0.045***	-0.045***	-0.053***	-0.053***	-0.052***	-0.052***
	[-8.81]	[-8.15]	[-9.79]	[-9.19]	[-10.12]	[-9.50]
$Ret_{-36,-13}$	-0.002**	-0.002**	-0.002***	-0.002***	-0.002***	-0.002***
	[-2.44]	[-2.35]	[-2.74]	[-2.67]	[-2.67]	[-2.63]
logmktcap	-0.184**	-0.120	-0.229***	-0.168**	-0.227***	-0.166**
	[-2.49]	[-1.63]	[-3.10]	[-2.27]	[-3.04]	[-2.24]
logBM	0.305***	0.326***	0.275***	0.296***	0.277***	0.296***
	[3.03]	[3.41]	[2.74]	[3.11]	[2.76]	[3.13]
turnover	-6.088***	-5.972**	-1.941	-1.477	-1.624	-1.276
	[-2.73]	[-2.52]	[-0.91]	[-0.65]	[-0.76]	[-0.56]
ivol	-0.479***	-0.503***	-0.463***	-0.489***	-0.480***	-0.504***
	[-4.50]	[-4.52]	[-4.30]	[-4.36]	[-4.53]	[-4.57]
Constant	3.363***	2.883***	3.100***	2.597***	3.096***	2.597***
	[5.71]	[4.84]	[5.24]	[4.34]	[5.24]	[4.35]
Avg.Monthly Obs.	801	804	801	804	800	803
R^2	0.076676	0.075904	0.078437	0.077781	0.081259	0.080599
# of months	192	176	192	176	192	176

Table 6

Net selling propensity sensitivity by alpha

This table reports returns on portfolios constructed based on net selling propensity variables. Net selling propensity variables are calculated by varying alpha on [-1, 1] in equation (9): $VNSP_t = Gain_t + \alpha \cdot Loss_t$. The range of (0, 1] in alpha is named the CGO side because it is expressed by monotonically increasing function in Figure 2; the range of [-1, 0) is the VNSP side. In each column, stocks are sorted by net selling propensity variable into five portfolios at the end of each month, with portfolio 5 containing stocks with the highest net selling propensity. Each portfolio is held for the following one month, and the time-series average of portfolio returns is reported. Returns are reported in three weights schemes: equal weights in Panel A, gross return weights in Panel B, and value weights in Panel C. The returns are in monthly percent, and *t*-statistics for the difference between portfolio 5 and 1 are in square brackets. *, **, and *** denote significance levels at 10%, 5%, and 1%.

Panel A: Equal Weights											
	CGO Side						VNSP Side				
alpha	1	0.8	0.6	0.4	0.2	0	-0.2	-0.4	-0.6	-0.8	-1
Smallest	1.582	1.562	1.553	1.520	1.451	0.894	0.084	0.008	0.013	0.072	0.091
2	0.979	0.959	0.938	0.931	0.908	1.101	0.931	0.780	0.681	0.630	0.631
3	0.812	0.820	0.823	0.815	0.819	1.024	1.130	1.145	1.236	1.225	1.271
4	0.834	0.858	0.892	0.939	0.995	1.144	1.549	1.651	1.631	1.679	1.624
Largest	1.330	1.337	1.331	1.331	1.364	1.372	1.836	1.944	1.967	1.922	1.912
5-1	-0.252	-0.226	-0.221	-0.189	-0.087	0.479	1.752***	1.936***	1.954***	1.850***	1.822***
t-stat	[-0.81]	[-0.72]	[-0.71]	[-0.60]	[-0.27]	[1.43]	[7.42]	[8.85]	[8.86]	[8.19]	[8.06]
Panel B: Gross Weights											
	CGO Side						VNSP Side				
alpha	1	0.8	0.6	0.4	0.2	0	-0.2	-0.4	-0.6	-0.8	-1
Smallest	1.518	1.496	1.484	1.454	1.377	0.799	-0.002	-0.054	-0.072	-0.017	0.001
2	0.975	0.954	0.931	0.918	0.883	1.060	0.943	0.752	0.690	0.646	0.652
3	0.790	0.799	0.801	0.793	0.810	1.001	1.111	1.154	1.243	1.227	1.279
4	0.813	0.836	0.873	0.927	0.984	1.155	1.529	1.656	1.638	1.694	1.621

Largest	1.322	1.331	1.326	1.322	1.357	1.354	1.787	1.881	1.910	1.870	1.872
5-1	-0.195	-0.166	-0.158	-0.131	-0.020	0.555	1.789***	1.935***	1.982***	1.887***	1.871***
t-stat	[-0.63]	[-0.53]	[-0.51]	[-0.42]	[-0.06]	[1.68]	[7.56]	[8.85]	[9.01]	[8.33]	[8.26]
Panel C: Value Weights											
	CGO Side						VNSP Side				
alpha	1	0.8	0.6	0.4	0.2	0	-0.2	-0.4	-0.6	-0.8	-1
Smallest	1.448	1.426	1.418	1.381	1.318	0.720	0.026	-0.015	0.020	0.107	0.126
2	0.834	0.810	0.790	0.777	0.754	0.965	0.819	0.711	0.603	0.530	0.538
3	0.764	0.776	0.786	0.795	0.786	0.980	1.036	1.041	1.147	1.157	1.213
4	0.814	0.833	0.871	0.915	0.986	1.106	1.511	1.605	1.605	1.664	1.626
Largest	1.384	1.392	1.381	1.384	1.396	1.403	1.783	1.901	1.912	1.851	1.825
5-1	-0.064	-0.034	-0.037	0.003	0.078	0.683**	1.756***	1.915***	1.892***	1.744***	1.698***
t-stat	[-0.20]	[-0.11]	[-0.12]	[0.01]	[0.24]	[2.02]	[7.42]	[8.96]	[8.82]	[7.95]	[7.77]

Table 7

Portfolio sorts on residual gain and loss in subsample

This table reports returns on double-sorted portfolios based on the residual values of gain and loss in the subsample. The residuals are constructed by regressing Gain and Loss on past returns, size, turnover, and idiosyncratic volatility. At the end of each month, stocks are independently sorted by the residual gain and loss. Stocks in a portfolio are weighted by their gross returns in the previous month. Each portfolio is to be held for the following one month, and the time-series average of portfolio returns is reported. The returns are in monthly percent, and t-statistics for the difference between portfolios 3 and 1 are in square brackets. *, **, and *** denote significance levels at 10%, 5%, and 1%.

Panel A: Double sorts on residual gain and loss, Adjusted return					
	Small gain	G2	Big gain	3-1	*t*-stat
Small loss	0.72	0.33	1.82	1.102***	[2.75]
L2	1.03	1.02	1.16	0.13	[0.41]
Big loss	1.59	1.88	2.64	1.044**	[2.19]
3-1	0.872**	1.552***	0.81		
t-stat	[1.96]	[3.85]	[1.52]		
Panel B: Number of firms in each portfolio					
	Small gain	G2	Big gain		
Small loss	40.0	66.0	63.9		
L2	66.6	99.2	61.2		
Big loss	63.3	61.7	45.6		

Table 8

Predicting returns with unrealized gain and loss in subsample, Fama-MacBeth regressions

This table reports results of Fama-MacBeth (1973) regressions of one-month return on lagged gain and loss variables and a set of control variables in the subsample. The dependent variable is return in month *t*, and the explanatory variables are available at the end of month *t-1*. Gain and Loss are defined in Equation (1) and (2). $Ret_{-12,-2}$ is the previous 12- to 2-month cumulative return, $Ret^{+}_{-12,-2}$ and $Ret^{-}_{-12,-2}$ are the positive and negative parts of $Ret_{-12,-2}$, Ret_{-1} is the past 1-month return, $Ret_{-36,-13}$ is the past 36- to 13-month cumulative return, logBM is the logarithm of book-to-market ratio, logmktcap is the logarithm of a firm's market capitalization, turnover is the average daily turnover ratio in the past one year, and finally, ivol is the idiosyncratic volatility, calculated as the volatility of daily return residuals with respect to Fama-French three-factor model in the past one year. The parameters and *t*-statistics (shown in square brackets) are calculated using the time series of corresponding cross-sectional regression estimates.*, **, and *** denote significance levels at 10%, 5%, and 1%. R^2 is the average R^2 from the cross-sectional regressions. Coefficient estimates for all months and for February to December are reported separately.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All	Feb-Dec	All	Feb-Dec	All	Feb-Dec	All	Feb-Dec	All	Feb-Dec
Gain	2.966	3.658	3.280	4.047*	6.611***	6.716***	6.950***	7.417***	6.882***	7.258***
	[1.32]	[1.56]	[1.45]	[1.71]	[3.34]	[3.25]	[3.82]	[3.90]	[3.81]	[3.86]
Loss	-1.507***	-1.547***	-1.797***	-1.862***	-0.880***	-0.962***	-1.032***	-1.135***	-0.963***	-1.034***
	[-3.91]	[-3.78]	[-4.93]	[-4.80]	[-2.64]	[-2.77]	[-3.16]	[-3.35]	[-2.97]	[-3.07]
$Ret^{+}_{-12,-2}$			-0.008*	-0.009*			-0.002	-0.003		
			[-1.85]	[-1.91]			[-0.43]	[-0.84]		
$Ret^{-}_{-12,-2}$			0.032***	0.033***			0.015**	0.016**		
			[4.27]	[4.23]			[2.26]	[2.31]		
$Ret_{-12,-2}$									0.002	0.001
									[0.62]	[0.17]
Ret_{-1}					-0.060***	-0.059***	-0.061***	-0.062***	-0.061***	-0.061***
					[-7.20]	[-6.71]	[-7.37]	[-6.96]	[-7.17]	[-6.74]
$Ret_{-36,-13}$					-0.002	-0.001	-0.002	-0.001	-0.002	-0.001

					[-1.38]	[-1.05]	[-1.18]	[-0.94]	[-1.40]	[-1.14]
logmktcap					-0.115	-0.066	-0.115	-0.052	-0.121	-0.058
					[-0.92]	[-0.52]	[-0.92]	[-0.42]	[-0.96]	[-0.46]
logBM					0.668***	0.723***	0.649***	0.719***	0.650***	0.724***
					[4.00]	[4.82]	[4.09]	[5.06]	[4.05]	[5.00]
turnover					-3.402	-2.958	-3.262	-2.588	-3.816	-3.197
					[-1.14]	[-0.93]	[-1.07]	[-0.81]	[-1.23]	[-0.98]
ivol					-0.576***	-0.625***	-0.547***	-0.552***	-0.574***	-0.591***
					[-3.70]	[-3.88]	[-3.36]	[-3.26]	[-3.31]	[-3.25]
Constant	0.686	0.345	1.111	0.760	2.970***	2.534***	2.936***	2.313**	2.924***	2.312**
	[0.85]	[0.40]	[1.48]	[0.97]	[3.32]	[2.79]	[3.04]	[2.40]	[3.00]	[2.38]
Avg.Monthly Obs.	565	568	563	566	559	562	557	560	558	561
R^2	0.017439	0.017998	0.039848	0.040779	0.085579	0.08554	0.098538	0.098663	0.093209	0.093349
# of months	96	88	96	88	96	88	96	88	96	88

Table 9

Portfolio sorts on V-shaped net selling propensity and capital gains overhang in subsample

This table reports returns on portfolios constructed based on net selling propensity variables in subsample. In Panel A, stocks are sorted by the V-shaped Net Selling Propensity (VNSP) into five groups at the end of each month, with portfolio 5 containing stock with the highest VNSP. Portfolios are constructed using equal weights, gross return weights, and value weights. Each portfolio is to be held for the following one month, and the time-series average of portfolio return is reported. For each weighting scheme, results for all months and the February to December period are reported. Panel B presents the same set of results in which stocks are sorted on the capital gains overhang (CGO). Panel C and D repeat the same exercises, but base the sorts on residual VNSP and residual CGO. The residuals are constructed by regressing raw net selling propensity variables (VNSP or CGO) on past returns, firm size, turnover, and idiosyncratic volatility. The returns are in monthly percent, and *t*-statistics for the difference between portfolios 5 and 1 are in square brackets. *, **, and *** denote significance levels at 10%, 5%, and 1%.

Panel A: Portfolio return, sorted on V-shaped net selling propensity (VNSP)						
	Equal weights		Gross weights		Value weights	
VNSP	All	Feb.-Dec.	All	Feb.-Dec.	All	Feb.-Dec.
Smallest	0.207	-0.175	0.098	-0.274	0.160	-0.165
2	1.077	0.648	1.067	0.628	0.996	0.602
3	1.465	1.204	1.444	1.176	1.386	1.153
4	1.909	1.704	1.906	1.705	1.894	1.712
Largest	2.082	1.924	2.019	1.859	2.037	1.908
5-1	1.875***	2.099***	1.921***	2.133***	1.877***	2.073***
t-stat	[5.19]	[5.77]	[5.36]	[5.85]	[5.11]	[5.52]
Panel B: Portfolio return, sorted on capital gains overhang (CGO)						
	Equal weights		Gross weights		Value weights	
CGO	All	Feb.-Dec.	All	Feb.-Dec.	All	Feb.-Dec.
Smallest	1.806	1.551	1.681	1.434	1.636	1.415
2	1.109	0.794	1.096	0.789	0.960	0.658
3	0.988	0.640	0.976	0.643	0.989	0.685
4	1.282	0.988	1.267	0.979	1.265	1.016
Largest	1.565	1.342	1.567	1.311	1.677	1.493
5-1	-0.241	-0.210	-0.113	-0.124	0.041	0.077
t-stat	[-0.50]	[-0.41]	[-0.24]	[-0.24]	[0.09]	[0.15]
Panel C: Portfolio return, sorted on V-shaped net selling propensity (VNSP) residual						
	Equal weights		Gross weights		Value weights	
res VNSP	All	Feb.-Dec.	All	Feb.-Dec.	All	Feb.-Dec.

Smallest	1.173	0.816	1.124	0.776	1.142	0.820
2	0.862	0.535	0.784	0.437	0.891	0.662
3	0.935	0.765	0.952	0.776	0.994	0.813
4	1.419	1.140	1.392	1.161	1.373	1.124
Largest	2.351	2.048	2.306	1.977	2.321	2.050
5-1	1.178***	1.231***	1.182***	1.200***	1.179***	1.230***
t-stat	[2.79]	[2.84]	[2.84]	[2.81]	[2.89]	[2.87]
Panel D: Portfolio return, sorted on capital gains overhang (CGO) residual						
	Equal weights		Gross weights		Value weights	
res CGO	All	Feb.-Dec.	All	Feb.-Dec.	All	Feb.-Dec.
Smallest	2.324	2.151	2.203	2.034	2.275	2.115
2	1.560	1.197	1.530	1.160	1.537	1.239
3	1.051	0.760	0.994	0.726	1.056	0.799
4	0.631	0.377	0.646	0.360	0.743	0.533
Largest	1.190	0.836	1.265	0.916	1.144	0.844
5-1	-1.134***	-1.315***	-0.938**	-1.118***	-1.132***	-1.270***
t-stat	[-3.07]	[-3.40]	[-2.51]	[-2.86]	[-3.06]	[-3.28]

Table 10

Predicting returns with CGO and VNSP in subsample, Fama-MacBeth regressions

This table reports results of Fama-MacBeth (1973) regressions of one-month return on lagged CGO and VNSP variables and a set of control variables in subsample. The dependent variable is return in month *t*, and the explanatory variables are available at the end of month *t-1*. VNSP and CGO are defined in Equation (9) with alphas equal to -0.15 and 1 respectively. $Ret^{+}_{-12,-2}$ and $Ret^{-}_{-12,-2}$ are the positive and negative parts of the past 12- to 2-month cumulative return. Ret_{-1} is the past one-month return, $Ret_{-36,-13}$ is the past 36- to 13-month cumulative return, logBM is the logarithm of book-to-market ratio, logmktcap is the logarithm of a firm's market capitalization, turnover is the average daily turnover ratio in the past one year, and finally, ivol is the idiosyncratic volatility, calculated as the volatility of daily return residuals with respect to Fama-French three-factor model in the past one year. The parameters and *t*-statistics (shown in square brackets) are calculated using the time series of corresponding cross-sectional regression estimates.*, **, and *** denote significance levels at 10%, 5%, and 1%. R^2 is the average R^2 from the cross-sectional regressions. Coefficient estimates for all months and for February to December are reported separately.

	(1)	(2)	(3)	(4)	(5)	(6)
	All	Feb-Dec	All	Feb-Dec	All	Feb-Dec
CGO	0.328	0.275			0.009	-0.020
	[1.05]	[0.84]			[0.03]	[-0.05]
VNSP			5.694***	6.333***	6.941***	7.437***
			[4.66]	[4.94]	[4.22]	[4.32]
$Ret^{+}_{-12,-2}$	0.001	0.000	-0.001	-0.003	-0.002	-0.003
	[0.39]	[-0.01]	[-0.36]	[-0.82]	[-0.43]	[-0.84]
$Ret^{-}_{-12,-2}$	0.013**	0.014**	0.014**	0.015**	0.015**	0.016**
	[1.97]	[2.04]	[2.15]	[2.22]	[2.26]	[2.31]
Ret_{-1}	-0.052***	-0.052***	-0.061***	-0.062***	-0.061***	-0.062***
	[-6.37]	[-5.92]	[-7.03]	[-6.64]	[-7.37]	[-6.96]
$Ret_{-36,-13}$	-0.001	-0.001	-0.002	-0.001	-0.002	-0.001
	[-1.02]	[-0.74]	[-1.25]	[-0.99]	[-1.18]	[-0.94]
logmktcap	-0.051	0.019	-0.115	-0.053	-0.115	-0.052
	[-0.42]	[0.16]	[-0.94]	[-0.43]	[-0.92]	[-0.42]
logBM	0.677***	0.748***	0.645***	0.715***	0.649***	0.719***
	[4.23]	[5.18]	[4.05]	[5.01]	[4.09]	[5.06]
turnover	-8.237***	-7.788**	-3.781	-3.025	-3.262	-2.588
	[-2.63]	[-2.36]	[-1.22]	[-0.93]	[-1.07]	[-0.81]
ivol	-0.519***	-0.522***	-0.532***	-0.536***	-0.547***	-0.552***
	[-3.19]	[-3.08]	[-3.24]	[-3.12]	[-3.36]	[-3.26]
Constant	3.166***	2.552***	2.977***	2.368**	2.936***	2.313**
	[3.29]	[2.65]	[3.08]	[2.44]	[3.04]	[2.40]
Avg.Monthly Obs.	558	561	558	561	557	560
R^2	0.092576	0.092581	0.095456	0.095529	0.098538	0.098663
# of months	96	88	96	88	96	88

국문 초록

한국 주식시장에서의 비대칭매도성향효과 분석

서울대학교 대학원

경영학과 재무금융전공

정 진 욱

본 연구는 Ben-David and Hirshleifer (2012)와 Li An (2016)에서 제시된 투자자들의 비대칭매도성향효과에 기반하여, 한국 주식시장에서 비대칭매도성향효과가 가격결정에 어떤 영향을 미치는지 살펴보았다. 미실현 이익과 미실현 손실이 큰 주식일수록 높은 미래 수익률이 예측된 바, 이는 미실현 이익과 미실현 손실이 큰 주식에 대한 투자자들의 매도성향이 강해지기 때문이다. 강한 매도성향에 의한 단기적 가격 하락 후 반등으로 높은 미래 수익률이 발생 됨을 알 수 있다.

주요어: 비대칭매도성향, 모멘텀 효과

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